

Inferential Statistics

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Education 504

Probability

- Probability is the scientific way of stating the degree of confidence we have in predicting something
- Tossing coins and rolling dice are examples of probability experiments
- The concepts and procedures of *inferential statistics* provide us with the language we need to address the probabilistic nature of the research we conduct in the field of education

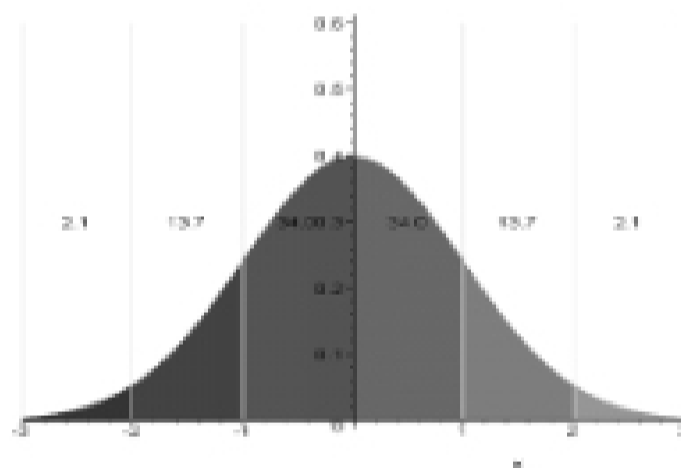
From Samples to Populations

- Probability comes into play in educational research when we try to estimate a population mean from a sample mean
- Samples are used to generate the data, and inferential statistics are used to generalize that information to the population, a process in which error is inherent
- Different samples are likely to generate different means. How do we determine which is "correct?"

The Role of the Normal Distribution

- If you were to take samples repeatedly from the same population, it is likely that, when all the means are put together, their distribution will resemble the normal curve.
- The resulting normal distribution will have its own mean and standard deviation.
- This distribution is called the *sampling distribution* and the corresponding standard deviation is known as the *standard error*.

Remember me?



Sampling Distributions

- As before, with the sampling distribution, approximately 68% of the means lie within 1 standard deviation of the distribution mean and 96% would lie within 2 standard deviations
- We now know the *probable* range of means, although individual means might vary somewhat

The Probability-Inferential Statistics Connection

- Armed with this information, a researcher can be fairly certain that, 68% of the time, the population mean that is generated from any given sample will be within 1 standard deviation of the mean of the sampling distribution.

Hypotheses Revisited

- Research hypothesis: the research prediction that is tested (e.g. *students in situation A will perform better than students in situation B*)
- Null hypothesis: a statement of "no difference" between the means of two populations (*there will be no difference in the performance of students in situations A and B*)

Why do we need a Null Hypothesis?

- The null hypothesis is a technical necessity of inferential statistics
- The *research hypothesis* is more important than the null hypothesis when conceiving and designing research
